

For example, the electron gun in Figure 1 may be in the form of an approximately 400 mm long and 50 mm diameter cylinder, but this is in no way limitative.

5 One preferred embodiment of the electron gun according to the invention is based on two principles, namely acceleration in pulsed mode and acceleration in « diode » mode. The electron gun in Figure 1 is an example of this preferred embodiment.

10 Concerning acceleration in pulsed mode, instead of applying a permanent electron acceleration voltage to a gun outputting a low electron current, for example 10 mA, the electron acceleration voltage is applied only during a small fraction of the time during
15 which the gun is used, preferably 1 thousandth of this time. For example, this voltage is applied for 2 μ s at a repetition rate of 500 Hz, but obviously the current must be 1000 times higher and therefore equal to 10 A.

 This has the advantage that it reduces
20 electrical insulation constraints that are much less severe for a short pulse (the probability of a breakdown varying with the square root of the voltage application time). The result is a reduction in the size and costs of high voltage generators and the
25 electron gun.

 Furthermore, the compactness of this gun has many complementary advantages, particularly the reduction of shielding volumes.

 Figure 2 shows variations with time t of a
30 pulsed negative high voltage V_a that can be applied to the cathode of an electron gun according to the